DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE CARSTADT FACILITY CARLSTADT, NEW JERSEY

PRELIMINARY

Prepared for:

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85C4372A

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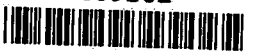


Section 2

SECTION TWO
SITE HISTORY

Prior to 1921, the Diamond Shamrock site in Carlstadt was owned by the Silver Fox Lard Company. Earlier, the site had been used as a clay pit but its ownership is uncertain. The Jacques Wolfe Company purchased the site in 1921 from Silver Fox and moved most of its operations from Clifton, New Jersey. Initially, Jacques Wolfe prepared textile finishing gums from natural tree sap, but added a variety of other products over the years. These included tin salts; sodium hydrosulfite; sodium formaldelyde sulfoxylate; dispersants based on naphthalene sulfonic acid condensates with formaldehyde as neutralized sodium salts; alkyl naphthalene sulfonic acid condensates as sodium salts; sodium salts of sulfonated creosol and phenol for condensed products; zinc formaldehyde sulfoxylate; sulfated castor oils and sodium salts thereof; and sulfated sperm oil.

In 1959, Jacques Wolfe was bought by a competitor, the Nopco Chemical Company. Nopco continued Jacques Wolfe's products and added urethane resins and a variation of sulfonated phenol called sulfone. The latter involved the use of monochlorobenzene for the first time at the site.

On 1967, Nopco was sold to the Diamond Alkali Company, which subsequently became Diamond Shamrock Chemicals Company (DSCC). Diamond continued the previous product line with the exception of tin salts, sodium hydrosulfite and castor and sperm oils. Table 2-1 is a complete list of raw materials at use at the site at present. Materials used in the past but discontunued include a variety of natural gums, tin, dodecyl benzene and toluene diisocyanate.

2.1 AERIAL PHOTOGRAPHS

An aerial photograph (Plate 2-1) shows the site during the 1940's before construction of building B12, the plant office building and the spray tower, a large cylindrical

structure partially completed in Plate 2-2. Smaller cylindrical vessels are seen under construction in Plate 2-2, adjacent to building B1, now an enclosed area. Plate 2-2 probably was made in the late 1940's or early 1950's before the pond road and tank farm were constructed. Near the center of the photographs (also Plate 2-1), a white rectangular area was used for off-loading sulfur from rail cars. The area is enclosed at present. Numerous other changes have occurred since the 1940's but the basic plant layout remains the same.

2.2 DISPOSAL PRACTICES

The primary waste from plant operations has been and continues to be gypsum sludge from filter mats. For the past 13 years the sludge has been classified as I-27 waste and disposed of in a local landfill. Prior to that, the sludge was pumped to equal basins northeast of the pond for dewatering. This is probably the white area seen on Plate 2-1 on the far side of the pond. The sludge, equal basins and their liners have been dug up and removed to the Bergen County landfill. It is clear from Plates 2-1 and 2-2 that the sludge was also left to dewater along the west shore of the pond during the tenure of the Jacques Wolfe Company. Some of this material may remain beneath the pond road, as a white sludge was encountered there during recent subsurface investigations (WCC, November, 1985).

Most other wastes produced by DSCC have been disposed of off site, with the exception of zinc oxide. Prior to 1976, zinc oxide was classified as I-27 waste and removed to a landfill. Since 1976 it has been stored on site because it is no longer acceptable as I-27 waste.

Sodium hydrosulfite filter cloths are no longer in use but in the past have been drummed and removed by Waste Conversions of Hatfield, Pennsylvania.

Prior to January, 1985, used ethyl alchol was recovered by distillation on site. The stills have been shut down and the still bottoms removed by SCA Corporation.

Production waste water (kettle wash) and floor wash are disposed of by sanitary sewer under NPDES #002 at a rate of about 3000 gal/day (Table 2-2).

Cooling water is discharged to surface waters to the east under NPDES #001A and 001A1.

2.3 SITE WATER BUDGET

Water for site activities is obtained from the pond, a production well located near the northwest corner of the property and from municipal supplies. Table 2-2 shows the plant water budget including intake, output and usage. Discharge is discussed in Section 2.2.

TABLE 2-I
RAW MATERIAL INVENTORIES

70% METHANE SULFONIC ACID
98% SULFURIC ACID
80% LACTIC ACID
85% PHOSPHORIC ACID
20% OLEUM
ACETIC ANHYDRIDE
70% HYDROXYACETIC ACID
METHYL ALCOHOL
ISOPROPYL ALCOHOL
N-BUTYL ALCOHOL
26°Be AQUA AMMONIA
ANHYDROUS AMMONIA
AMMONIUM CARBONATE
HYPOPHOSPHOROUS ACID
ITACONIC ACID
99.5% SULFAMIC ACID
MONOCHLOROBENZENE
BISPHENOL A
PHENOL
90% META/PARA CRESOL
BENZOYL CHLORIDE
DIETHYLENE GLYCOL
TRIETHANOLAMINE
AMINOETHYLETHANOLAMINE
TETRAETHYLENE PENTAMINE
DIETHANOLAMINE
POLYOL 395
POLYVINYL PYRROLIDONE
HEXYLENE GLYCOL
DIPHENYLAMINE (TECH)
UCON 50 HB 5100
CELLOSOLVE ACETATE
PLURACOL POLYOL TP740
METHYLDIETHANOLAMINE
PLURACOL POLYOL TP1540
PLURACOL POLYOL TP440
POLYPROPYLENE GLYCOL
POLYALKYLENE TRIOL
1,3 BUTYLENE GLYCOL
ACTIVATED CARBON
70% FORMIC ACID
37% FORMALDEHYDE
DIBUTYL-TIN DILAURATE
DIAMATACEOUS EARTH
GUM KARAYA SCREENINGS
TRIMETHYLOL PROPANE
HYDROGEN PEROXIDE
BUTYLATEDHYDROXYTOLUENE
ETHYL ANTIOXIDANT 330
HYDRATED LIME
LECITHIN (UNBLEACHED)
DIMETHOXANE
PARAFORMALDEHYDE FLAKES
ACRYLAMIDE MONOMER
SODIUM BENZOATE
50% SODIUM HYDROXIDE

TABLE 2-I (Continued)

PETROLEUM NAPHTHALENE
COAL TAR NAPHTHALENE
MINERAL SPIRITS
DIETHYL SULFATE
ORTHO-CRESOL (SYNTHETIC)
TERGITOL XD
ALFOL 20+ ALCOHOL
POTASSIUM CARBONATE
45% POTASSIUM HYDROXIDE
POTASSIUM PERSULFATE
SODIUM CHLORIDE (SALT)
SODIUM SULFATE (ANHYDROUS)
DICYANDIAMIDE
SILICONE OIL EMULSION
XYLENE (URETHANE GRADE)
ACRYLAN SBC
PARAFFIN OIL

BICARBONATE OF SODA
SODIUM SULPHIDE FLAKES
DENSE SODA ASH
MOLTEN SULFUR
ZINC DUST (MEADOWBROOK)
ZINC DUST (ROYCE)
ZINC DUST (NJ ZINC)
TRISODIUM PHOSPHATE
SODIUM TRIPOLYPHOSPHATE
HAMPENE 100
TETRAPOTASSIUM PYROPHOSPHATE
UREA
THIOUREA DIOXIDE
XYLENE (COMMER. GRADE)
25% SODIUM CHLORITE
MINERAL OIL
OLEIC ACID

TABLE 2-2

SITE WATER BUDGET

(million gallons per day)

	INTAKE	
	Municipal 0.03	Pond 1.8
		Well 0.4
TOTAL	0.03	2.2
	USAGE	
Production	0.007	—
Cooling	—	1.5
Boiler	0.015	—
Sanitary	0.005	—
Vacuum	—	0.7
Total	0.027	2.2
	OUTPUT	
	0.027	2.2

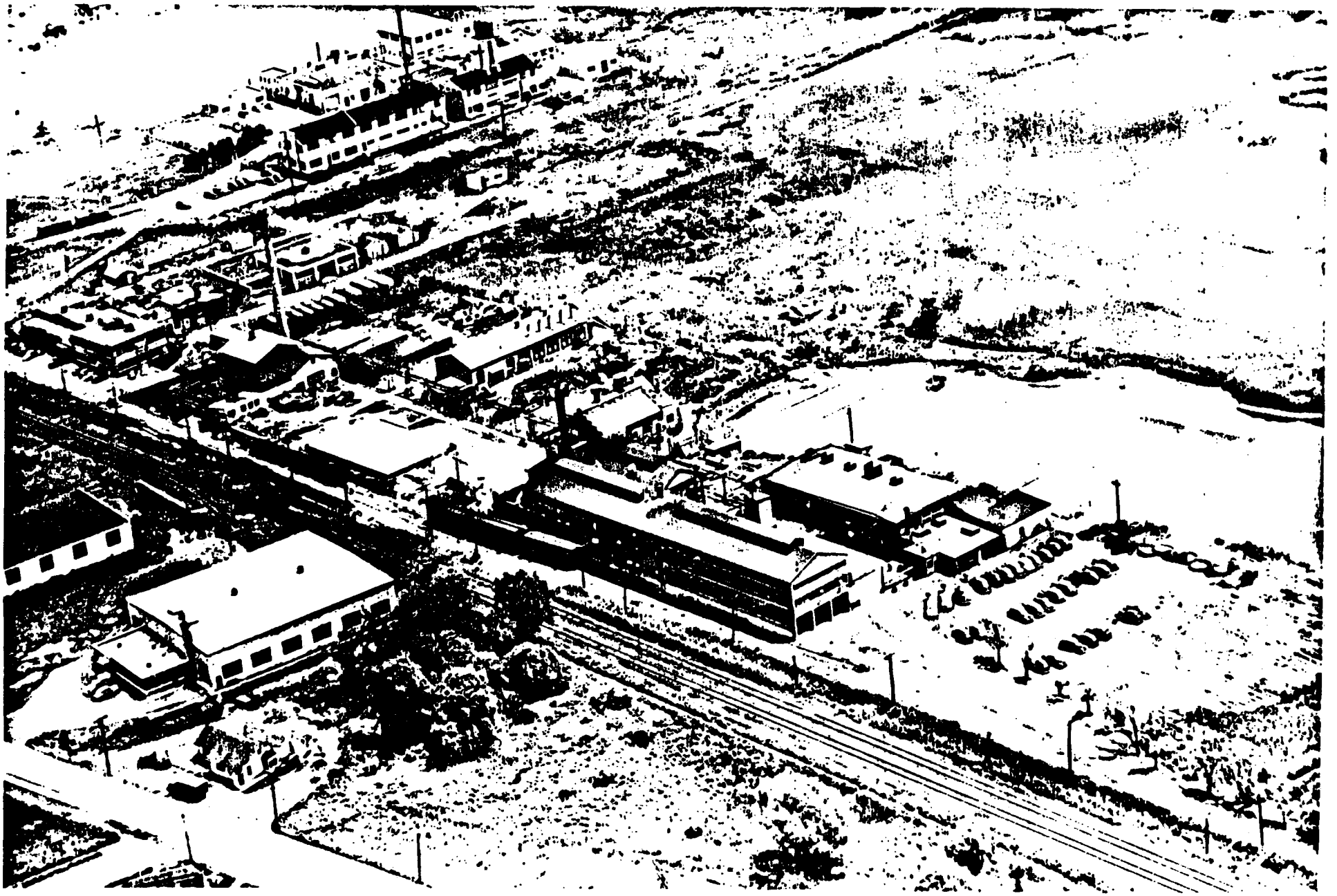


Plate 2-1

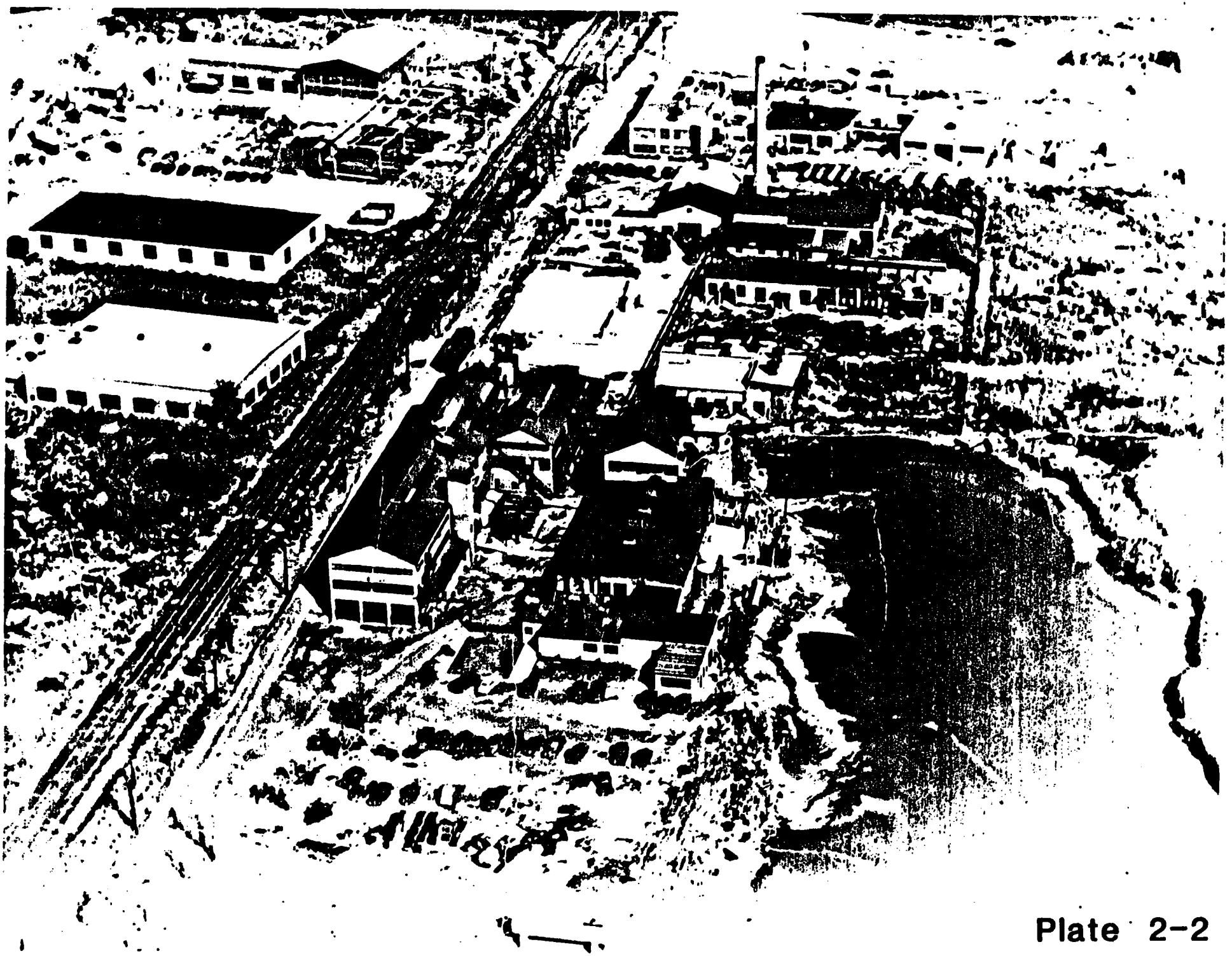


Plate 2-2

Section 3

SECTION THREE
BACKGROUND INFORMATION

In April, 1985, DSC engaged Woodward-Clyde Consultants (WCC) to investigate the effects of a leak in a heat-exchange unit that had contained PCB oil (Ascarel) prior to 1973. The investigation has been in progress since May, 1985 and has been carried out in two phases. Work proposed herein constitutes the third, and probable final phase. Results of previous investigations have been described in reports to DSC (WCC, 6 June and 8 November, 1985). A small amount of data has been collected since then and is reported herein. Copies of WCC's reports have been submitted by DSC to NJDEP and USEPA. The following includes a brief summary of these reports and background information pertaining to the geology and environment of the site.

3.1 GEOLOGY

The Carlstadt plant is located in the northwestern part of the Hackensack River estuary (Hackensack Meadowlands) near a tributary called Berry's Creek (Figure 3-1). The plant's pond is a tidal body that occupies an old clay pit. The pond is bordered on the east by marshland.

The Hackensack River estuary is thought to be underlain by a U-shaped channel which was formed by glacial erosion of the ancient Hudson River valley. Bedrock crops out in Carlstadt west of the site but drops off sharply beneath Rt. 17 to more than 200 ft below sea level. Much of the Meadowlands are underlain by sediment more than 200 ft thick of glacial origin. In general, till and coarse glacio-fluvial detritus is overlain by clay deposits of glacial Lake Hackensack. These are overlain, in turn, by clay and silty clay of estuarine origin and organic-rich deposits commonly referred to as "meadow mat".

The geology beneath the site and vicinity has not been investigated directly by WCC below a depth of 8 ft. Investigations of this interval, however, have

revealed that the site is underlain by fill 3 ft thick or more. The fill is underlain by silty clay; no meadow mat has been observed.

Stratigraphic information from depths below 8 ft has been obtained from well logs on file at the Division of Water Resources. Two test wells within approximately 1000 ft of the site were drilled and logged by the Hackensack Water Company (Carlstadt #2 and #3; Table 3-1). A log of a third test well, about 2 miles from the site at Berry's Creek and Paterson Plank Road, was also obtained (Moonachie #1; Table 3-1). The logs of the Carlstadt wells indicate that clay and sandy clay at least 20 to 25 ft thick underlie a few feet of fill and black muck. These are probably the estuarine and Lake Hackensack deposits. Coarser detritus predominates below and probably is of glacial origin. Bedrock lies at approximately 260 ft depth.

3.1.1 Ground Water

Ground water levels at the site have been observed to fluctuate seasonally. During May and August, 1985, ground water was directly beneath the plant floor and swampy conditions prevailed near the railroad siding west of the plant. Elsewhere around the site, the water table appeared to lie at depths of 3 to 5 ft. in borings made during August. In November, 1985, the water level beneath the floor of buildings B1 and B12 had fallen about 2 ft. below the floor slab. Seeps along the west bank of the pond indicate that ground water is commonly above pond level.

The ground water flow direction has not been investigated at the site. Topography and drainage patterns, however, suggest that flow is probably from west to east.

3.2 PREVIOUS INVESTIGATIONS

According to the Carlstadt plant manager, Mr. Robert Chonoles, PCB oil leaked from a heat-exchange unit in the southwest corner of building B12 and probably entered an old sump located nearby in the northwest corner of building B1 (Figure

3-2). The date of the leak is not known precisely but is thought to have occurred prior to 1979. The system contains Mobiltherm at present, a heat-exchange medium that is not based on PCB. The previous, PCB-bearing medium was Ascarel.

In May, 1985, WCC installed four shallow borings around the sump (Figure 3-2) and sampled both solid (soil) and liquid phases. Laboratory analysis for PCB indicated concentrations in soil up to 644 ppm, in oil up to 5.5% and in water up to 960 ppm. Results from the oil phase are thought to indicate that Ascarel, diluted by a low-density liquid, was floating on ground water.

As a result of the preliminary investigation, DSC directed WCC to obtain soil samples from the perimeter of buildings B1 and B12 to determine whether PCB had migrated beyond the foundation walls. Results showed that migration had occurred, primarily to the east, and that PCB was present in fill beneath the pond road at concentations up to 2590 ppm (Figure 3-2). In addition, the higher concentrations of PCB were accompanied by a volatile liquid which subsequent analysis showed to be monochlorobenzene (MCB). A similar liquid was noted in borings west of the sump where little or no PCB was found. The implication is that MCB from an unknown source west of the sump migrated eastward carrying PCB with it. The pathway of migration is thought to be an old access roadway for the former clay pit, now the pond, which is filled with relatively permeable, sandy material (Figure 3-3). If correct, this hypothesis suggests that MCB/PCB mixture is migrating eastward through fill beneath the plant toward fill beneath the bottom of the pond. Phase III investigations are planned to test this hypothesis, as well as meet the other objectives listed in section 1.1.

An equally important result of Phase II was that the silty clay deposits were found to be uncontaminated by PCB/MCB, even where substantial contamination occurred directly above in fill (WCC, November, 1985).

Ground water beneath building B1 was checked for the presence of MCB in November, 1985 at the request of DSC. The water was sampled at borings B-1, 2 and 3 with a clear glass tube. No floating oil or other foreign material was observed. One sample was analyzed for purgeable halocarbons (method 601), but none was detected. Further ground-water sampling is proposed in Section 4.4.1.

TABLE 3-1
CONDENSED LOGS OF HACKENSACK WATER COMPANY
TEST WELLS

(depth in feet)

Carlstadt #2

0-2 fill

2-7 black muck
7-25 gray clay
25-27 sandy clay
27-92 sand + gravel
(water-producing at top)
92-109 soupy fine sand
109-130 red clay+fine sand
130-263 sand+gravel ± clay
263 red rock

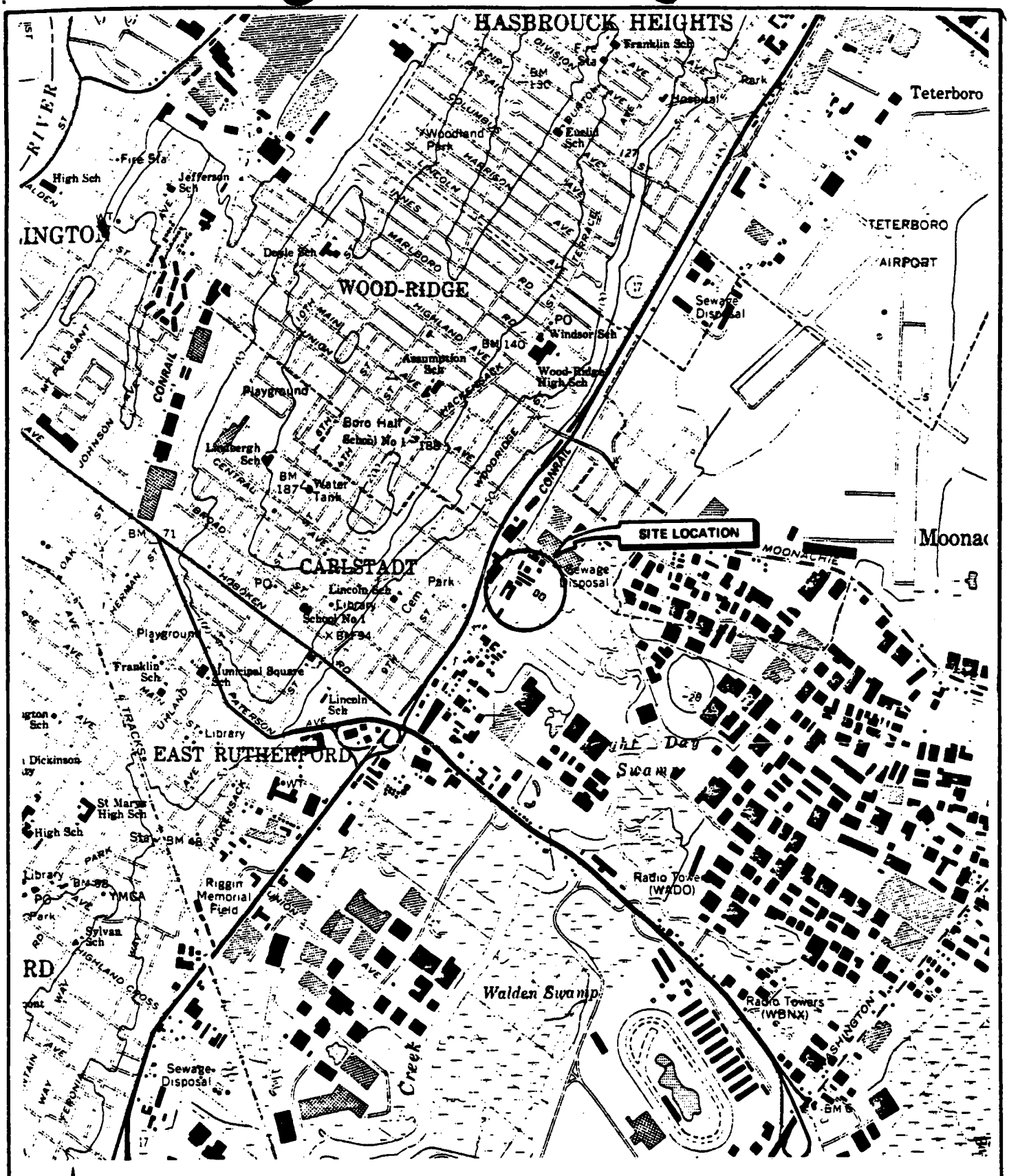
Carlstadt #3

3-10 black muck

10-38 brown + gray clay
38-86 sand + gravel

Moonachie #1 (Berry's Creek and Patterson Plank Road)

0-1 fill
1-4 black muck
4-79 varicolored clay
79-106 sandy clay
106-113 sandy+gravel ± clay
113-238 sand+gravel ± clay
(water-producing at top)
238 red rock

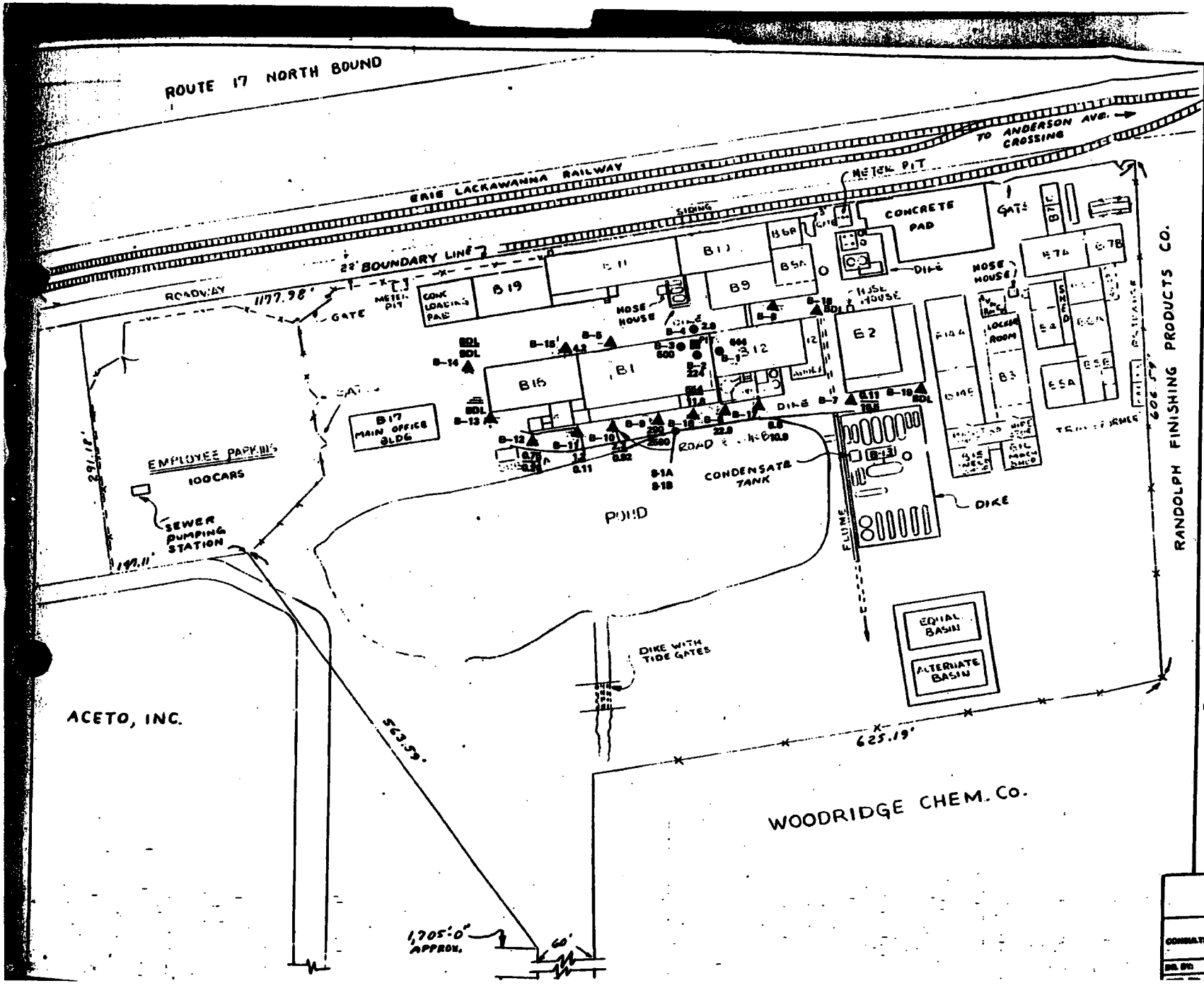


DIAMOND SHAMROCK FACILITY AT CARLSTADT–SITE LOCATION MAP

WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: TJD	SCALE: AS SHOWN	PROJ. NO.:85C43372A
CK'D. BY: NLB	DATE: 23 JUNE 1986	FIG. NO.: 3–1



GENERAL NOTES

1 ADDRESS OF [illegible] AVE
ORIT N.J. [illegible], N.J.
07072

0 100 200FT
SCALE

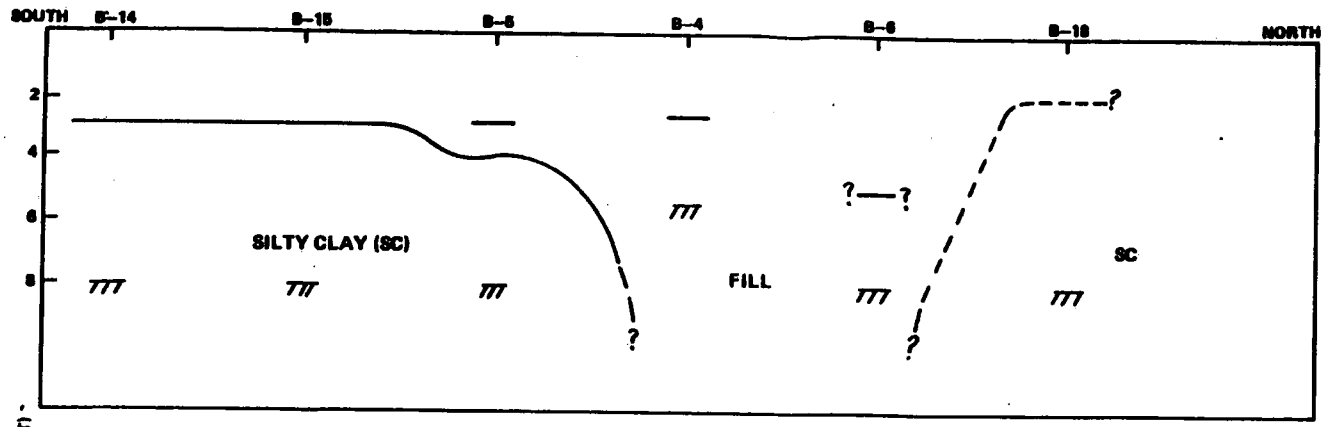
LEGEND

	PCB (ppm)
0.21	3FT – 6FT
1.20	7FT – 8FT
BDL	BELOW DETECTION LIMIT
●	B–1 BORING LOCATION AND NUMBER, 6/85
▲	B–6 BORING LOCATION AND NUMBER, 6/85

PHASE II RESULTS

WOODWARD—CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: MKS | SCALE AS SHOWN | PROJ. NO.: [illegible]



LEGEND

B-18 BORING NUMBER

—— FIRST OCCURRENCE OF MONOCHLOROBENZENE

BOTTOM OF BORING

STRATIGRAPHIC SECTIONS

WOODWARD—CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

TRAVISE, NEW JERSEY

DR. BY: TJD	SCALE: AS SHOWN	PROJ. NO.: 80-0573	
CHK. BY: NLB	DATE: 1 NOV 1980	FIG. NO.: 2-5.4	